

**WATER SUPPLIES DEPARTMENT**

**STANDARD SPECIFICATION E-89-01**

**ADVANCED METERING INFRASTRUCTURE (AMI) OUTSTATION**

1. Scope

This standard specification stipulates the requirements of the Advanced Metering Infrastructure (AMI) outstations for wired smart water meters. AMI outstations were formerly named as Automatic Meter Reading (AMR) outstations.

(a) The Works shall comprise:

- submission of design proposal, testing and commissioning proposal and operation and maintenance (O&M) manual for the AMI outstation to the WSD for approval;
- design, supply, installation, testing and commissioning of the AMI outstation including all its components;
- design, supply, installation, testing and commissioning of cable containment, wiring, earthing and other associated installations for the AMI outstation;
- programming and configuration of data concentration units (DCU), meter interfacing units (MIU) and network equipment according to the parameters and settings given by the WSD;
- provision of electricity supply and Internet service at all necessary locations for normal operation of the AMI outstation;
- handing over of the AMI outstation and associated installations together with the O&M manual and record drawings to the WSD for operation and maintenance upon successful commissioning of the same;
- provision of 24-month warranty for the AMI outstation and associated installations against defects and poor workmanship after handing over of the same.

(b) Unless otherwise specified, all equipment and instruments provided shall be suitable to operate 24/7 at ambient conditions of relative humidity 10% to 90 % and temperature 0°C to 50°C.

(c) Stainless steel specified hereinafter shall comply with BS EN 10088-2 Grade 1.4401 (ASTM Grade 316).

2. Overview of Advanced Metering Infrastructure (AMI) system

The AMI system of the WSD collects metering data remotely and automatically

manages and analyzes metering data, provide output for billing and water supplies management and disseminates useful information to customers.

The part of the infrastructure for wired meters consists of AMI outstations and AMI master station. A typical AMI outstation comprises water meters equipped with a meter interfacing unit (MIU), an M-Bus network, a data concentration unit (DCU), a VPN router as well as power supply equipment with backup battery.

The AMI master station of the WSD comprises necessary backend hardware and software, and is equipped with the required network communication and security equipment, together with all AMI outstations to form a complete AMI system.

The water meters equipped with a MIU for building up the AMI outstation under the Works will be supplied by the WSD. The Developer, or his contractor (hereinafter referred to as “the Contractor”), shall supply (except smart water meters), install and commission the AMI outstation according to the requirements as specified by the WSD from time to time.

### 3. AMI Outstation

An AMI outstation shall be designed to collect metering data from smart water meters and transmit them to the AMI master station at the WSD. The requirements of the components composing the AMI outstation shall be as follows:

#### 3.1 Smart Water Meters and Meter Interfacing Units (MIUs)

Smart water meters will be provided by the WSD for installation by the Contractor. Based on the water consumption of customers, the smart water meters shall be of mechanical, electromagnetic or other types as deemed appropriate by the WSD.

##### (a) Mechanical water meters and MIUs

Mechanical water meters are equipped with a MIU which reads the meter register and transfer the meter reading via M-Bus communication protocol to a DCU. Each MIU comes with a flexible meter cable for connecting to the bus-wire of the M-Bus network. The Contractor shall be responsible for the cable installation and termination between the MIUs and the bus-wire of the M-Bus network.

The MIU will serve as an interface between the water meter and the M-Bus network. It will record the meter readings and store in its internal memory with date and time stamps and transmit the stored data to the DCU via the M-Bus bus-wire once a data interrogation request is initiated by the DCU.

##### (b) Electromagnetic (EM) water meters

EM water meters are equipped with a flow converter capable of generating electric pulse output for AMI application.

If the EM water meter operates on a 220V a.c. auxiliary power supply, a 220V 13A IP 54 fused spur unit shall be provided close to the EM water meter.

A pulse to M-Bus converter for interfacing of metering data in pulses with DCU in M-Bus protocol is required and shall be provided by the Contractor. The pulse to M-Bus converter shall be bus-powered with backup battery, housed inside an IP54 enclosure and properly fixed or mounted at a secure location.

### 3.2 M-Bus Network

The M-Bus is based on European Standard EN 13757 and EN 1434, and developed for remote reading of utility meters. The M-Bus network shall supply the power necessary for interrogation of metering data from the MIUs installed on the smart water meters.

- (a) The M-Bus network shall be composed of a LSHF sheathed and PVC insulated 4-core 1.5 sq.mm stranded and twisted copper cable with two cores to serve as the bus-wire for the M-bus system, while reserving the remaining two cores as spare cores. The cable shall be installed in 25mm conduit. The meter cables from the MIUs shall be connected to the M-Bus network via the terminal blocks inside an M-Bus terminal box.
- (b) The M-Bus network shall be reverse-polarity protected and used for both data transmission and power supply from the DCU to the MIUs. The M-Bus network shall be short-circuit proof and no bus failure shall be resulted in case of faults in any MIU.
- (c) The M-Bus network shall support various bus topologies, including linear, star and tree configuration with any given segment, up to 250 MIUs. The maximum M-Bus cable length shall be 350 metres.
- (d) The M-Bus shall adopt a master-slave communication protocol, which shall facilitate bi-directional data transmission from DCU to MIU triggered by changing voltage in the M-Bus bus-wire. The nominal bus voltage shall be around 36V at the master's output. Communication requests shall be activated by change of voltage to the input circuits of the MIU by the DCU, while the data transmission from the MIU to DCU shall be triggered by changing current demand at the MIU. The transmission rate shall be adjustable from 300 to 2,400 baud (bits per second) supporting automatic error detection by means of parity and checksum to enable repetition of data transmission in the event of an error.

### 3.3 Advanced Metering Infrastructure (AMI) Panel

The AMI panel shall be designed for housing DCU, network device, power supply unit and other necessary equipment.

#### 3.3.1 Enclosure

The panels shall be designed for indoor wall-mounted installation and fabricated with

1.5mm thick stainless steel. The size of the panels shall be not smaller than 400(w) x 500(h) x 200(d) mm. The panels shall be protected to IP54. The circuit and connection diagrams shall be provided inside the panel.

### 3.3.2 Data Concentration Unit (DCU)

The DCU shall serve as the M-Bus master of the M-bus network, which is designed to collect metering data at a programmable interval from the MIUs of meters and store the meter readings to its non-volatile memory for transmission to the AMI master station via the Internet.

- (a) The DCU shall be able to automatically transmit the metering data via Internet connection using an integrated RJ45 LAN interface port. Each DCU shall be connected direct to the Internet router by Category 5e/6 network cable, or through a central Ethernet switch if required.
- (b) All Category 5e/6 cables for the interconnection between network devices such as switch, DCU, router, modem, etc. shall not be longer than 100 metres. In case long-distance data transmission is required, additional Ethernet fiber media converters and interconnect fiber optic cable shall be provided.
- (c) The DCU shall be capable of connecting all the M-Bus devices of the AMI outstation with 10% spare capacity. Additional DCU shall be provided if necessary.
- (d) The DCU shall come with an internal real-time clock with date, time and battery backup for timestamping data, logs and events.
- (e) The DCU shall be programmable to initialise retrieval of meter reading data from the MIUs at an interval of 15 minutes, 30 minutes, 1 hour, 2 hours, 4 hours, 6 hours, 12 hours or 24 hours.
- (f) The DCU shall have an internal non-volatile memory of capacity sufficient to store 500,000 meter readings.
- (g) The DCU shall be equipped with at least one additional communication port (USB/Ethernet/RS232) for firmware upgrading, parameter configuration and diagnosis by a notebook computer installed with the DCU configuration and diagnosis software. The software shall be provided together with the DCU.
- (h) The DCU shall use FTP protocol to transmit XML metering data to the AMI master station.
- (i) The DCU shall be protected to IP20, compact, and specifically designed and manufactured for smart metering applications.
- (j) The DCU shall operate on 220V 50Hz a.c. or 24V d.c. power supply from the backup battery unit described at Section 3.4 below. For the former, a suitably rated d.c. to a.c. inverter shall be provided.

### 3.3.3 Router and Switch

- (a) The router shall be designed for industrial use capable of serving a high speed, high availability and high reliability performance. The router shall support the features of firewall, VPN security and SNMP management. The router shall be able to access the Internet through cable or mobile (e.g. 3G/4G/5G) broadband network service provided by the ISP.
- (b) The router shall provide VPN security encryption feature with VPN tunneling protocol such as IPSec, OpenVPN, etc with AES 256.
- (c) The router shall have a Dynamic DNS feature to update the IP address to its hostname in a Dynamic DNS server.
- (d) The router shall be integrated with an Ethernet switch which shall provide at least one Ethernet WAN 10/100Mbps port (RJ45) and four Ethernet LAN 10/100Mbps ports (RJ45), or a separate Ethernet switch with same number of ports shall be provided. At least one spare LAN port shall be available to access the Web GUI of the router without interrupting the operation of the network.
- (e) The router shall operate on 24V d.c. power supply from the backup battery unit described at Section 3.4 below.

### 3.4 Backup Battery Unit

- (a) The backup battery unit shall provide the backup power to the AMI outstation when the input power source is interrupted. Unless otherwise specified, each AMI panel shall be provided with a dedicated backup battery unit.
- (b) The backup battery unit shall be made up of the following:
  - Sealed and maintenance free battery;
  - Battery charger with automatic charging facilities;
  - Separate panel enclosures for (a) and (b)
  - Interconnecting cables between (a) and (b)

#### 3.4.1 System Operation

The backup battery unit shall operate from a 220V 50Hz a.c. power supply. Unless otherwise specified, the nominal output voltage of the battery supply shall be 24V d.c..

The battery capacity shall be able to support the operation of the whole AMI outstation for four (4) hours with 20% safety margin to take into account all various derating factors under a.c. power failure condition. The battery capacity calculation shall be based on a discharge rate of 0.2C or higher. The Contractor shall provide the sizing calculations for the battery including the relevant pages from the battery datasheet showing the discharge characteristics under the discharge rate used for capacity calculation.

Battery cells shall be of maintenance-free sealed lead-acid type with a minimum design

life of 5 years. Cell containers shall be made of moulded translucent plastic and resistant to impact and corrosive attack by the electrolyte.

The equipment supplied shall include all sub-units and components to form a complete system.

#### 3.4.2 Battery Charger Panel

The Battery Charger Panel shall comply with the following requirements:

- (a) The enclosure shall be fabricated with 1.5mm thick stainless steel to IP54 with louvred ventilators.
- (b) It shall be designed for housing a 24V battery charger, backup battery and the associated power supply and control wirings.
- (c) If the capacity of the battery is more than 24Ah, the battery shall be housed inside a separate Battery Panel.
- (d) The charger shall be designed to BS EN 54-4 for charging the backup battery automatically with load connected. Minimum output current of the charger with battery charging off shall be not less than 5A.
- (e) The charger shall be protected against output short-circuit/overcurrent, temperature high, output overvoltage and accidental polarity reversal.
- (f) The battery discharged to its final voltage shall be recharged to at least 80% of its rated capacity within 24 hours and to its rated capacity within another 48 hours.
- (g) The front panel shall be equipped with LED status and alarm indicators.
- (h) A set of changeover volt-free contacts for common fault alarm shall be provided.

#### 3.4.3 Battery Panel

The Battery Panel for housing the 24V battery separately shall comply with the following requirements:

- (a) The enclosure shall be fabricated with 1.5mm thick stainless steel to IP54 with louvred ventilators.
- (b) The enclosure shall be sized to accommodate the battery cells in a single row.
- (c) A thermistor sensor shall be provided for monitoring the temperature of the battery and connected to the battery charger for adjustment of battery charge voltage.

### 4. Cabling Facilities and Site Installation

A complete cabling system shall be provided for the AMI outstation and installed by competent workers of the electrical trade:

- (a) The Works specified herein shall comply with the latest edition of the Code of Practice for the Electricity (Wiring) Regulations issued by Electrical and Mechanical Services Department (EMSD), HKSAR Government and the General Specification for Building Services Installation in Government Buildings of the Hong Kong Special Administrative Region issued by Architectural Services Department (ArchSD), HKSAR Government, where applicable.
- (b) The Contractor shall supply, install, connect and terminate a complete system of power cables, control cables, M-Bus cables, communication network cables and all other cables to all equipment, devices, instruments and ancillaries supplied, modified and installed for the AMI outstation.
- (c) The cabling work shall include the provision of conduits, trunkings, brackets, supports, channels, cleats, ties, lugs, glands, shrouds, tapes, markers, ferrules, joints, terminations etc., as necessary and required to form a complete, neat and safe installation.
- (d) All surface conduits shall be 25mm Class 4 hot-dipped galvanised steel conduits. All surface boxes shall be cast iron boxes unless otherwise specified. Adaptable boxes shall be complete with a galvanized steel cover.
- (e) The Contractor shall show the type, size and installation method for the power, control, M-Bus and communication network cables on the drawings.
- (f) The Contractor shall also supply and install all necessary earthing equipment and cables to form a complete, neat and safe installation as required to comply with the relevant wiring regulations.
- (g) IP54 cast aluminum M-Bus terminal boxes with a minimum size of 220mm(w) x 120mm(h) complete with terminal blocks and cross connectors shall be supplied and installed on each floor to facilitate connection of the MIU meter cables to the M-Bus network. The metering data shall be conveyed via the bus-wire to the DCU for data concentration and temporary storage.
- (h) The cable or cellular modem for Internet connection shall be housed inside a separate non-metallic box next to the AMI panel. The power supply to the modem shall be backed up by the 24V backup battery unit described at Section 3.4 above by means of a d.c. to a.c. inverter or a d.c. to d.c. converter.
- (i) Even not explicitly specified, all civil and building services work arising from execution of the Works shall be deemed to have included.

5. Electricity Power Supply and Internet Service

220V 50Hz a.c. power supply and Internet access shall be provided free of charge to the

Water Authority at all necessary locations for 24/7 operation of the AMI outstation after the installation is handed over.

6. Civil Requirement for Cabling Works

- (a) At least two cable conduits shall be provided to run through the water meter room of each floor and terminate to a 150mm(w) x 150mm(h) x 75mm(d) adaptable box for installing M-Bus and network communication cables.
- (b) The AMI panel shall be installed in one of the meter rooms (hereinafter called AMI equipment room) which is situated on the ground floor, or near and above the ground floor. If more than one AMI panel is provided, the panels shall be suitably distributed and located to minimise the cable length between the smart water meters and the AMI panel.
- (c) If a cellular router or modem is used for Internet connection but the router or modem cannot be installed above ground, a 20mm spare conduit shall be provided between the AMI panel concerned and the nearest possible location facing the open air on the ground. The conduit shall be terminated to a 75mm x 75mm switch box with cover 2,000 mm above ground level.
- (d) A 220V 50Hz a.c. power supply through a metal-clad switched 13A fuse spur unit with pilot light and a wall space of 800mm(w) x 1,000mm(h) having front clearance of at least 900mm for mounting an AMI panel with its power supply equipment shall be provided.
- (e) Should the requirements specified in (d) above not be met in the water meter room(s), a covered and lockable area on the same floor of the respective meter room shall be provided for mounting the AMI panel instead.
- (f) All concealed conduits shall be either Class 4 hot-dipped galvanised steel or heavy duty PVC conduits. Concealed PVC conduits installed within concrete or brick walls and floor slabs shall have concrete, cement or plaster cover of thickness not less than 30 mm to prevent penetration of cables inside the conduits by nails, screws or alike.
- (g) The installation location of the AMI panel, battery charger panel, battery panel and any other auxiliary equipment shall be easily accessible to facilitate operation and maintenance. AMI panels and auxiliary equipment shall not be installed under any pipework.
- (h) The maximum distance between the M-Bus terminal box to each smart water meter shall be 1.5 metres. Additional M-Bus terminal boxes shall be provided as necessary.
- (i) All panels, devices, conduits, trunkings, surface boxes and components forming part of the AMI outstation shall be properly identified using labels, color coding or other means agreed with the WSD.



7. Intellectual Property and Proprietary Rights

- (a) If the supplied equipment requires intellectual property rights, appropriate licences shall be obtained from the relevant rights owners and copies of which shall be furnished to the WSD prior to handing over of the system.
- (b) All technical information, documents and manuals furnished to the WSD shall have the license, copyright or written permission from the proper rights holder for using of those materials by the WSD.
- (c) Documentary evidence of all licences of all software for the Works shall be provided prior to handing over of the system to the WSD.

8. Testing and Commissioning (T&C)

- (a) After completing the installation of the AMI outstation and prior to setting to work, individual equipment shall be tested to ensure that it performs in accordance with the specified requirements and is in satisfactory working conditions.
- (b) The Contractor shall follow the standard procedure described hereunder to test and commission the AMI outstation. Depending on the complexity of the AMI outstation, the Contractor may be requested by the WSD to perform additional tests to verify the specific functionality of the outstation.
- (c) Before energizing, the Contractor shall ensure the following:
  - i. The AMI outstation is installed in accordance with all relevant drawings, circuit diagrams and the specified requirements;
  - ii. All cables and individual conductors are labeled and ferruled as per the relevant drawings;
  - iii. All items of the AMI outstation are adequately and correctly labelled and identified;
  - iv. The insulation resistance and continuity of all conductors of cables, etc. are acceptable; and
  - v. The earthing arrangements are complete and a satisfactory value of earth loop impedance of each circuit has been achieved.
- (d) All measuring instruments, indicators, testing computers, network testing instruments and other apparatus necessary for carrying out the tests shall be provided by the Contractor and accepted by the WSD.
- (e) The T&C procedure shall include, but not limited to, the following:

- i. Cable insulation test;
  - ii. Cable continuity test;
  - iii. Copper and optic fiber (if any) network cable test;
  - iv. Earth fault loop impedance test;
  - v. General and functional checks of each component;
  - vi. Configuration and operation check on the MIUs;
  - vii. Integrity test of the AMI data on the DCU;
  - viii. Integrity test of the AMI data on the AMI master station;
  - ix. Change over test on the backup battery unit;
  - x. Operation check on the AMI outstation upon a.c. power supply failure;
  - xi. Discharge test on the battery of the AMI outstation;
- (f) Final acceptance test for full function of the AMI outstation including successful data transmission to the AMI master station shall be conducted by the Contractor to the satisfaction of the WSD.

9. System Transfer for Operation and Maintenance and Warranty

- (a) Upon successful commissioning of the AMI outstation by the Contractor to the satisfaction of the WSD, the whole system shall be handed over to the WSD for operation and maintenance.
- (b) Two (2) complete sets of hardcopy of the final O&M manual with softcopy in pdf format in a CD-ROM shall be provided.
- (c) The Contractor shall arrange a joint handover inspection with the WSD to check and confirm the well-being and well-functioning of the AMI outstation and all its components.
- (d) All the equipment supplied and installed by the Contractor are subject to a warranty by the Developer against defects and workmanship for 24 months from the handing over date of the AMI outstation to the WSD.

10. Submissions

- (a) An AMI outstation proposal detailing the design, layout and equipment for building up the AMI outstation shall be submitted to the WSD for approval prior to commencement of installation work.
- (b) A testing and commissioning proposal shall be submitted to the WSD for

approval prior to commencement of testing and commissioning work.

- (c) An operation and maintenance (O&M) manual complete with all necessary O&M information, record drawings and technical schedules shall be submitted to the WSD for approval prior to handing over of the AMI outstation.
- (d) The checklists on documents to be included in AMI outstation submission can be found in the Appendix.

## 11. Coordination and Responsibility

The Developer shall employ a responsible engineer with competence and experience in electrical or building services installation to be responsible for building up the AMI outstation. The responsible engineer shall be responsible for, but not limited to, the following duties:

- (a) Coordinate and communicate with the WSD in building up the AMI outstation;
- (b) Arrange, check and endorse all submissions including proposal, drawings, T&C procedure, O&M manual and technical information to the WSD;
- (c) Oversee all aspects of the AMI outstation project including planning, organising, coordinating, supervising and monitoring of the supply, installation, T&C and handing over of the Works;
- (d) Supervise and monitor the Works to ensure the AMI outstation is supplied, installed, tested and commissioned in accordance with the proposal, requirements and drawings approved by the WSD;
- (e) Monitor and report the work progress, and ensure the Works are completed within the required time frame;
- (f) Coordinate the interfacing of the AMI outstation with works by others.

## 12. Reference Documents

The Contractor shall further note the requirements specified in the “Standard Requirements for Supply and Installation of AMI outstation”, “Introduction of the AMI System in WSD” and “Typical Drawings for the Supply and Installation of AMI outstation” issued by the WSD, which can be obtained via the following website, in relation to the AMI outstation(s):

*<http://www.wsd.gov.hk/en/plumbing-engineering/index.html>*

## 13. Terms, Definitions and Abbreviations

### 13.1 Terms and Definitions

"Works"                      The work or services to be carried out, completed, maintained

and/or supplied in accordance with the scope and requirements of this Standard Specification and includes temporary works.

“Developer”	The person, firm, company or the Purchaser (as defined in the Conditions of Sale) responsible for the execution of the Works.
"Contractor"	The person, firm or company employed by the Developer for the execution of the Works.

### 13.2 Abbreviations

AES	Advanced Encryption Standard
Dyn DNS	Dynamic Domain Name System
FTP	File Transfer Protocol
HKSAR	Hong Kong Special Administrative Region
IP	Internet Protocol
IPSec	Internet Protocol Security
ISP	Internet Service Provider
LAN	Local Area Network
M-Bus	Meter-Bus
SNMP	Simple Network Management Protocol
VPN	Virtual Private Network
WAN	Wide Area Network
WSD	Water Supplies Department
XML	Extensible Markup Language

- End of this Specification -

**Checklist on Documents for Inclusion in Advanced Metering Infrastructure  
(AMI) Outstation Proposal**

**Part I – General Information**

Address of Premises: \_\_\_\_\_

Name of Consumer:(In English) \_\_\_\_\_

(In Chinese) \_\_\_\_\_

ASN/CCID No. (if applicable): \_\_\_\_\_

WSD Reference No. (if applicable): \_\_\_\_\_

No. and Size of Smart Fresh Water Meters Involved

Size	DN 15	DN 25	DN 40	DN 50	DN 80	DN 100				
No.										

\*Target/Actual Date of Pre-sale (if applicable): \_\_\_\_\_  
(AMI outstation design proposal should be approved by the Water Authority beforehand)

\*Target/Actual Date of Occupation: \_\_\_\_\_  
(AMI outstation installation should be completed and handed over to the Water Authority beforehand)

\* delete as appropriate

Submitted by: \_\_\_\_\_

Company Name: \_\_\_\_\_

Telephone No. \_\_\_\_\_

Email Address: \_\_\_\_\_

Date of Submission: \_\_\_\_\_

## Part II – Documents to be Included

Please tick the appropriate boxes

(A) Design Proposal		Included in the Proposal	Not Applicable
(1)	Site location plan showing: <ul style="list-style-type: none"> <li>- the site location and boundary of the development</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
(2)	Particular building floor layout plan showing: <ul style="list-style-type: none"> <li>- the meter room(s)/box(es)/cabinet(s) for housing the AMI panel(s) with dimensions</li> <li>- the location of the MCB distribution boards supplying power to the AMI equipment including the EM type smart meters</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
(3)	AMI equipment room (meter room/box/cabinet for housing the AMI panel) layout plan showing: <ul style="list-style-type: none"> <li>- the position of AMI panel with dimensions</li> <li>- the conduits, adaptable box, M-Bus terminal box and 13A fuse spur unit with dimensions</li> <li>- that the distance between M-Bus terminal box and the farthest meter is not more than 1.5m</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
(4)	Design of the AMI outstation including: <ul style="list-style-type: none"> <li>- single line schematic diagram</li> <li>- general arrangement of AMI panel</li> <li>- power supply circuit diagram</li> <li>- communication network diagram showing the proposed ISP connection (cable/cellular)</li> <li>- number of meters connected to each DCU and the max. no of devices that can be connected</li> <li>- pulse-to-M-Bus converter for EM watermeter (if any)</li> <li>- 220V a.c. power supply points for battery charger panels and EM water meters (if any)</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
(5)	Meter Schedule showing: <ul style="list-style-type: none"> <li>- the service address of each smart water meter in the building that requires individually metered water supply</li> <li>- the numbers, sizes and types of smart water meters</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
(6)	Equipment Schedule including: <ul style="list-style-type: none"> <li>- a list containing details of equipment for AMI outstation with brand and model no.</li> <li>- no. of M-Bus devices supported by the DCU and the capacity of internal memory</li> <li>- calculations to prove the battery size is capable for supporting the backup operation in specified hours (if requested by the WSD)</li> <li>- dimensions, material and the degree of protection of each AMI panel</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>

(7)	<p>Project Implementation Programme</p> <ul style="list-style-type: none"><li>- key dates within Building Covenant Period including those of pre-sale, occupation of premises, etc.</li><li>- dates of collection and installation of smart water meters</li><li>- other activities including design, installation, testing and commissioning and handover of the AMI outstation</li></ul>	<input type="checkbox"/>	<input type="checkbox"/>
(8)	<p>Other information required by the Water Supplies Department (WSD). Please specify:</p>  <hr/>	<input type="checkbox"/>	<input type="checkbox"/>

Please tick the appropriate boxes

(B) Testing and Commissioning (T&C) Proposal		Enclosed in the Proposal	Not Applicable
(1)	Request for Inspection Form - Duly completed invitation form for joint inspection with the WSD.	<input type="checkbox"/>	<input type="checkbox"/>
(2)	Readiness of Internet Broadband Service - A copy of service contract or latest bill for the Internet broadband service.	<input type="checkbox"/>	<input type="checkbox"/>
(3)	Pre-energizing Test Records - General check on workmanship and approved design compliance - Insulation and continuity test of power, M-Bus and control cables - Earth loop impedance test of power supply points - Continuity and performance test of copper and optical (if any) network cables	<input type="checkbox"/>	<input type="checkbox"/>
(4)	Updated Drawings - As-built drawings with markups showing how the AMI outstation was actually built versus the approved design.  - Supplementary drawings for the meter room/box/cabinet layout plans showing: <ul style="list-style-type: none"> <li>● location of each meter room/box/cabinet</li> <li>● detailed layout of the meter room/box/cabinet with dimensions</li> <li>● position of meters</li> <li>● position of M-Bus terminal boxes</li> <li>● that the distance between M-Bus terminal box and the farthest meter is not more than 1.5m</li> <li>● layout and routing of cable conduits</li> <li>● the meter room/box/cabinet is lockable</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
(5)	Updated Documents - Equipment Schedule - Project Implementation Program - Contact Persons for testing and commissioning matters - Meter installation summary table showing the installation location, ID address, size, etc of each smart meter	<input type="checkbox"/>	<input type="checkbox"/>
(6)	Other information required by the Water Supplies Department (WSD). Please specify:  _____	<input type="checkbox"/>	<input type="checkbox"/>



Please tick the appropriate boxes

(C) Operation and Maintenance (O&M) Manual		Enclosed in the Proposal	Not Applicable
(1)	Full set of record drawings	<input type="checkbox"/>	<input type="checkbox"/>
(2)	Full list of equipment installed	<input type="checkbox"/>	<input type="checkbox"/>
(3)	Summary of settings, IP addresses, keys and passwords of devices	<input type="checkbox"/>	<input type="checkbox"/>
(4)	Operation and maintenance instructions of major equipment <ul style="list-style-type: none"><li>- Data concentration unit</li><li>- VPN router</li><li>- Battery charger</li><li>- Others as requested by the WSD</li></ul>	<input type="checkbox"/>	<input type="checkbox"/>
(5)	Other O&M information required by the Water Supplies Department (WSD). Please specify:  _____	<input type="checkbox"/>	<input type="checkbox"/>